

B270

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G11B 7/26, 23/00 // B29D 17/00		A1	(11) International Publication Number: WO 99/63535
			(43) International Publication Date: 9 December 1999 (09.12.99)
(21) International Application Number: PCT/SE99/00910 (22) International Filing Date: 28 May 1999 (28.05.99) (30) Priority Data: 9801934-2 29 May 1998 (29.05.98) SE (71) Applicant (for all designated States except US): OBDUCAT AKTIEBOLAG [SE/SE]; P.O. Box 580, S-201 25 Malmö (SE). (72) Inventor; and (75) Inventor/Applicant (for US only): OLSSON, Lennart [SE/SE]; Förridargatan 13, S-216 21 Malmö (SE). (74) Agent: AWAPATENT AB; P.O. Box 5117, S-200 71 Malmö (SE).		(81) Designated States: AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments. In English translation (filed in Swedish).	
(54) Title: RAW MATRIX FOR OPTICAL STORAGE MEDIA AND A METHOD OF MANUFACTURING SUCH A MATRIX (57) Abstract <p>In a method of manufacturing a matrix for making optical storage media a plate-shaped matrix body is formed. Then a resist coating is applied on one side of the body by spinning a polymer over the body starting from a central portion of the body with a view to forming a blank for a matrix. Finally a central opening is formed in the body, preferably by punching the central portion of the body, thereby forming a raw matrix with a resist coating extending from the peripheral edge of the central opening.</p>			

BEST AVAILABLE COPY

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

Raw matrix for optical storage media and a method of manufacturing such a matrix.

The present invention relates to a method of manufacturing a matrix for making optical storage media. The invention also relates to a blank for a matrix as well as a raw matrix.

5 When making optical storage media, such as compact disks, use is made of what is referred to as matrixes as a form for the information-carrying structure of the storage medium. The matrix constitutes one half of a mould for moulding said storage media. A matrix consists of a circular, planar plate of metal, in which
10 a central opening is formed. The opening is used in the making of storage media.

In the methods that are traditionally used for making optical storage media, matrixes of metal are
15 manufactured one by one by the matrixes being built up on a substrate provided with a pattern. This is time-consuming and costly work which comprises a plurality of steps of manufacture and which places high demands on advanced equipment for manufacturing
20 the matrixes.

Therefore an object of the present invention is to provide an improved method of manufacturing matrixes for making optical storage media.

A specific object is to provide a rational method of
25 manufacturing matrixes.

A special object is to ensure a high quality in the manufacture of matrixes.

According to the invention, these and other objects that will be apparent from the following description are
30 now achieved by a method according to appended claim 1. The objects are also achieved by a blank for a matrix according to appended claim 6 and by a raw matrix according to appended claim 7. Preferred embodiments are defined in the dependent claims.

The invention is based on the idea of manufacturing in a first step a "raw matrix", which in a subsequent step is provided with an inscription by working the surface of the raw matrix.

5 According to a first aspect of the invention, a plate-shaped matrix body is formed, on which a resist coating, such as a photoresist coating, is applied on one side. This is achieved according to the invention by spinning a polymer over the body starting from a central
10 portion of the body.

By spinning the polymer from the central portion, a uniform resist coating can easily be obtained over the entire plate-shaped body. Any irregularities are limited to the central portion.

15 After the forming of the resist coating, a central opening is formed in the body by removing the central portion, preferably by punching the central portion of the body. As a result, the entire resist coating will be uniform from the edge of the opening radially outwards.
20 Thus the matrix can be provided with a high-quality inscription up to the edge of the opening.

By spinning, in accordance with the inventive concept, the resist coating from a central position and only then punching a central opening, a higher quality, a
25 larger writing surface and lower manufacturing costs will be obtained than in the case where the resist coatings are spun after the opening has been punched.

The opening formed after removal of the central portion preferably constitutes the final opening which is
30 used in the making of optical storage media. It is preferred for the matrix body to cover the entire central portion when applying the resist since the resist material can thus be spun from a single central position. However, the invention is not limited in this respect. It
35 may in some cases be advantageous to form a smaller opening in the body and apply the resist starting from a central area round the smaller opening, whereupon the cen-

tral area is removed. Also this embodiment is included in the inventive concept as will be expressed in the appended claims.

5 In a preferred embodiment there is formed in a subsequent step an information-carrying inscription in the resist coating by an irradiation (exposure) and developing process in some prior art manner, whereupon a corresponding structure is formed in the matrix body by an etching or application process.

10 According to a second aspect of the invention, it comprises a blank for a matrix, which has a plate-shaped matrix body extending from a central portion to a circular peripheral line, and a resist coating extending radially outwards from the central portion of the body.
15 The central portion is adapted to be removed in a subsequent step. No final central opening has thus yet been formed in the matrix body. In a particularly preferred embodiment, the blank has no opening at all inside the peripheral line.

20 According to a third aspect of the invention, it comprises a raw matrix with a plate-shaped matrix body, which has a central opening and a resist coating extending from the peripheral edge of the central opening and having a uniform thickness. The raw matrix, which in
25 itself constitutes an intermediate product in the manufacture of a completed matrix, has thus been manufactured by forming a central opening in the matrix blank described above. Then no further change or working of the inner diameter or outer diameter is made after exposure
30 or forming of structure, for instance by an etching or application process.

A preferred embodiment of the invention will now be described for the purpose of exemplification.

A matrix body in the form of a circular disk of
35 nickel is formed. A suitable volume of a suitable resist material is placed in the centre of the disk, whereupon the disk is rotated so that the resist material is spun

to a uniform layer over the matrix body which then constitutes a blank for a matrix. Subsequently, the central portion of the disk is punched, thereby forming a raw matrix. The raw matrix undergoes lithographic processing, 5 in which an information-carrying pattern is exposed to radiation and developed according to prior art methods, so that the matrix body is uncovered in selected surface portions in a pattern corresponding to the information with which the matrix is to be provided. Then a structure 10 is etched into the matrix body in the uncovered surface portions. Finally the rest of the resist coating is removed, thereby forming a completed matrix with an information-carrying surface structure. Optionally the surface structure is given a protective treatment before 15 the matrix is ready for use.

CLAIMS

1. A method of manufacturing a matrix for making
5 optical storage media, characterised by the steps of
forming a plate-shaped matrix body,
applying a resist coating on one side of the body by
spinning a polymer over the body starting from a central
10 portion of the body, and
forming, after said step of application, a central
opening in the body provided with a resist coating by
removing the central portion, preferably by punching the
central portion of the body.
- 15 2. A method as claimed in claim 1, wherein said
opening is formed such that the resist coating extends
from a peripheral edge which defines said opening.
3. A method as claimed in claim 1 or 2, wherein the
central opening is formed in the body before the resist
20 coating is provided with an information-carrying inscription.
4. A method as claimed in claim 3, wherein the information-carrying inscription is formed in the resist coating by a subsequent exposure and developing process.
- 25 5. A method as claimed in claim 4, wherein a structure corresponding to the inscription in the resist coating is formed in the matrix body by an etching or application process.
6. A blank for a matrix for optical storage media,
30 characterised by a plate-shaped matrix body extending from a central portion which is adapted to be removed, to a circular peripheral line, and a resist coating extending radially outwards from the central portion of the body.
- 35 7. A raw matrix for optical storage media, characterised by a plate-shaped matrix body, which comprises a central opening and a resist coating

extending from the peripheral edge of the central opening, the resist coating having a uniform thickness from said peripheral edge radially outwards.

- 5 8. A raw matrix as claimed in claim 7, which, with maintained dimensions of the body and the opening and after forming an information-carrying structure in the matrix body, is useable when making optical storage media.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/00910

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: G11B 7/26, G11B 23/00 // B 29 D 17/00 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC6: G11B, B29D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
EPAT, WPI, JAPIO		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9604652 A1 (BIFANO, THOMAS, G), 15 February 1996 (15.02.96) --	1-8
A	US 4954065 A (KOJI SHINDO ET AL), 4 Sept 1990 (04.09.90) --	1-8
A	US 4354988 A (CLAUDE BRICOT ET AL), 19 October 1982 (19.10.82) --	1-8
A	EP 0405568 A2 (E.I. DU PONT DE NEMOURS AND COMPANY), 2 January 1991 (02.01.91) --	1-8
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "B" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
21 October 1999		29 October 1999 (29.10.99)
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86		Authorized officer Benny Andersson/MN Telephone No. +46 8 782 25 181

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/00910

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Patent Abstracts of Japan, abstract of JP 60-177452 A (DAICEL KAGAKU KOGYO K.K.), 11 Sept 1985 (11.09.85) -----	1-8

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SE 99/00910

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9604652 A1	15/02/96	CA 2195109 A	15/02/96
		CN 1159863 A	17/09/97
		EP 0772875 A	14/05/97
		JP 11501434 T	02/02/99
		US 5503963 A	02/04/96
		US 5783371 A	21/07/98
US 4954065 A	04/09/90	DE 3872907 A	27/08/92
		EP 0284387 A,B	28/09/88
		JP 63237234 A	03/10/88
US 4354988 A	19/10/82	CA 1157607 A	29/11/83
		EP 0015834 A,B	17/09/80
		SE 0015834 T3	
		FR 2450683 A,B	03/10/80
		JP 56051031 A	08/05/81
		US 4407646 A	04/10/83
EP 0405568 A2	02/01/91	CA 2020175 A	31/12/90
		CN 1048619 A	16/01/91
		DE 69024415 D,T	31/10/96
		HK 144496 A	09/08/96
		JP 2116959 C	06/12/96
		JP 3116564 A	17/05/91
		JP 8027996 B	21/03/96
		US 5188863 A	23/02/93

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.